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FY 1999 - FY 2001

Currently, powerplant and pumping plant maintenance scheduling is built around time-based maintenance. Equipment is maintained after a specified time interval regardless of actual need. Time-based maintenance, in general, is inefficient and causes some equipment to be over maintained and other equipment to be under maintained. Predictive maintenance systems have been ineffective due to the overwhelming volume of data to be monitored and lack of knowledge about the most informative monitoring instrumentation. Development and implementation of a condition monitoring system at Reclamation's hydro plants will provide valuable information which will allow maintenance personnel to make informed decisions on what equipment is in need of maintenance and when to perform this maintenance. Reclamation-wide savings resulting from eliminating unnecessary maintenance and reducing unscheduled outages could be several million dollars a year.

The long-term goal of this research effort is to make available to every Reclamation hydroelectric plant, where it is shown to be cost effective, a plant-wide condition monitoring system. To show its effectiveness, a pilot condition monitoring system will be installed. The implementation of this system will demonstrate how it will assist in maintenance improvements, increase reliability, reduce outages, and promote cost reductions. To achieve this long-term objective, the FY 1999 objectives were:

- Identify critical equipment at Reclamation plants to be monitored.
- For each piece of critical equipment, ascertain the parameters that need to be monitored.
- Start to identify, install, and evaluate commercially available equipment that meets Reclamation's condition monitoring needs.
- Where commercial equipment is not available, begin developing monitoring techniques and associated computer algorithms to monitor these equipment Parameters.

As a first step to meet the long-term goal of the research, each of the FY 1999 objectives listed above was met. Specifically, the following was accomplished:

- Hydro plant equipment was rated and critical equipment was identified.
- Measurement parameters for this critical equipment were identified.
- PDA (Partial Discharge Analysis) systems were installed at Yellowtail and Grand Coulee, and measurement data were gathered from these systems plus previously installed systems at Glen Canyon and Davis.

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- A contract was awarded to install a rotor-mounted scanner at Grand Coulee.
- The cavitation monitoring system at Glen Canyon was modified and the data were evaluated.
- The portable power system monitor at Yellowtail was expanded to include a rough zone monitor.
- Data on maintaining protection relays were gathered with the goal of revising Reclamation's testing program.
- The initial design of an air-gap flux monitor was completed. · A portable transformer oil monitoring system was purchased and evaluated.
- A DC battery test set was purchased and evaluated. · Participation in the IEEE sub-committee on hydro plant condition monitoring was continued.

Reclamation projects: Grand Coulee, Glen Canyon, Davis, Yellowtail, Morrow Point. Federal Agencies: Bonneville Power Administration.

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